Attorney Docket No. 23700.00

IN THE APPLICATION

OF

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FOR A

METHOD FOR FORMING A DECORATIVE FLOWER POT

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METHOD FOR FORMING A DECORATIVE FLOWER POT

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

The present invention relates to flower pots. More specially, the invention relates to flower pots having a decoration on the outer peripheral surface of the flower pot.

2. DESCRIPTION OF THE RELATED ART

Flower pots and flower pot holders having decorations disposed thereon are well known in the field. U.S. Patent Publication No. 2003/0116268, published June 2003, discloses a method of wrapping a pot with a cover having adhesive or cohesive disposed thereon. The application discloses an adhesive and material dispenser for dispensing single sheets of material from stacks of sheets of material or from rolls of material and applying an adhesive to the sheet.

U.S. Patent Publication No. 2003/0172587, published September 2003, discloses a method for forming a decorative cover for a flower pot with a sheet of material having printed and embossed patterns disposed thereon. However, as in the '268

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application, the '567 application teaches a cover to a flower pot and not the flower pot itself.

A method and apparatus for the injection molding of elongated cylindrical articles is disclosed in U.S. Patent No. 3,397,266, issued to Ralph E. Ayres in August 1968. The device discloses a method of reducing mandrel deflection during the molding operation by injecting plastic on the axis of generation at the bottom and causing the mandrel and mold to define a restriction at the base of the cavity so that the material being injected exerts a radially outward pressure on the mandrel which significantly overcomes the tendency of the mandrel to deflect.

U.S. Patent No. 4,170,618, issued to R. Adams in October 1979, discloses a decorative container for holding a flower pot, the container being formed by arranging a sheet of plastic polymer upon a form, the form having a shape generally desired for the sheet after it has been molded. The sheet-covered mold is placed within a heater, with the temperature of the heater being warmed to a temperature necessary to soften and fold the plastic sheet about the form. As in the '268 application and the '567 application, the device described in this patent is designed to provide a cover for a flower pot, not the flower pot itself.

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U.S. Patent No. 4,170,622, issued to A. Uhlig in October 1979, disclose a method for reinforcing hollow articles blow molded from a heated plastic material. A hollow parison is formed with concave grooves in its exterior surface at locations in which the finished article is to be reinforced. The parison is then blow molded into the finished article. The blowing pressure and the temperature of the plastic material collapse and fuse the concave grooves to form solid reinforcement ribs located inside the article, while the exterior of the article has a rib-free surface defined by the blow mold.

U.S. Patent No. 4,467,994, issued to J. Sorenson in August 1984, discloses a mold having a number of circumferential throttles, the throttles having shorter throttle distances than prior designs, which improves the rigidity of the molded thin-walled hollow product.

U.S. Patent No. 5,228,934, issued to Weder et al., in July 1993, discloses a method of forming a sheet of material into a flower pot or flower pot cover, the method including means for forming pleats in the skirt and/or base of the flower pot.

U.S. Patent No. 5,577,988, issued to Weider et al. in November 1996, discloses an apparatus and method for forming a sheet of material into a flower pot or flower pot cover with

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fins. The apparatus includes a male mold, a female mold having an opening mating with the male mold, and means for moving the male mold into and out of the opening of the female mold with the sheet of material between the two molds. To form outwardly extending fins in the flower pot cover, fingers are extended from the male mold to push folds in the sheet of material between segments of the female mold.

U.S. Patent No. 5,725,468, issued to Weder et al., in March 1998, discloses an apparatus and method using vacuum to form a flat-paneled flower pot or flower pot cover. The method of the '468 patent includes a male die, a female die, air pressure and vacuum to form a sheet of material into a flat-paneled flower pot or flower pot cover. A platform supports the female die, which has an opening with flat surfaces for forming panels in the base and skirt of the flower pot or flower pot cover. The male die has forming surfaces, which mate with the forming surfaces of the female die. The sheet of material is centered over the opening of the female die. A bracket having a plurality of legs, which aligns with the panel-forming surfaces of the female die, is placed on the sheet of material. Air pressure directed through vacuum lines in the opening of the female die is used to control the sheet of material as the male

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die enters the opening of the female die. The top surface of the platform and the bracket legs provide additional control of the sheet of material. The sheet of material is pressed between forming surfaces of the male and female die to form the flat-paneled flower pot or flower pot cover.

U.S. Patent No. 5,820,712, issued to Weder et al. in October 1998, discloses a material dispenser for dispensing single sheets of material from stacks of sheets of material or from rolls of material and applying an adhesive strip to the sheet. The adhesive strip is applied by contacting the adhesive portion of an adhesive transfer tape to the sheet. The sheet of material with the adhesive strip applied thereto can be used to wrap floral arrangements, flower pots, or other articles. The apparatus may be combined with an automatic pot wrapping apparatus so that the adhesive application and decorative pot wrapping sequence can be combined into one continuous operation.

Finally, U.S. Patent No. 5,839,255, issued to Weder in November 1998, discloses a method of forming a preformed pot cover for a flower pot having a three-dimensional printed pattern thereon wherein the three-dimensional pattern is produced by application of a foamable ink composition.

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None of the above inventions and patents, taken either singly or in combination, is seen to describe the instant invention as claimed. Thus a flower pot solving the aforementioned problems is desired.

SUMMARY OF THE INVENTION

The present invention is a method of forming a decorative design on the peripheral outer surface of a plastic flower pot. A plastic flower pot having an embossed decoration disposed on its outer peripheral surface is vacuum formed within a mold having an embossed decoration disposed on the inner surface of the mold. A plastic sheet is placed over the opening of a mold cavity, and then heated. When the plastic is soft and pliable, a vacuum removes the air from the inside of the cavity, drawing the plastic down and against the inside walls of the mold, forming a flower pot with an embossed outer surface. The vacuum formed flower pot may have a plurality of sides and contours, thereby providing the pot with added structural rigidity.

Because vacuum forming results in stretching and distortion of any design disposed on the surface of the plastic prior to vacuum forming, a method of decorating the peripheral surface of a vacuum-formed flower pot is desirable. One method includes

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bonding a decorative wrapper to the outer peripheral surface of a vacuum formed flower pot. The pot may have smooth walls or may be embossed. If embossed, the decorative wrapper preferably has a matching embossed design to facilitate bonding.

Another method solving the distortion effects of vacuum molding entails pre-distorting the image formed on the sheet of plastic to be vacuum formed. By taking a desired image and pre-distorting it based upon the distortion characteristics of the vacuum forming process, the design, when stretched, produces a flower pot having a decoration that, although not perfect, is a good deal less distorted than if the image was not compressed.

Accordingly, it is a principal object of the invention to form a flower pot having a decorative design using vacuum forming.

It is another object of the invention to form a flower pot having an embossed design on its outer peripheral surface using a vacuum forming method.

It is a further object of the invention to form an embossed plastic flower pot having a structural integrity greater than smooth-walled plastic flower pots.

Still another object of the invention is to form a plastic flower pot having a decorative outer wrapper.

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It is another object of the invention to form a plastic flower pot having a decorative design on its outer peripheral surface that is not distorted by the vacuum forming process.

It is another object of the invention to form a decorative design on a vacuum formed flower pot by placing a pre-distorted image of the desired design on a plastic sheet that is to be vacuum formed into a flower pot.

Still another object of the invention is to create a radial matrix on a plastic sheet from which a flower pot is formed having a clear template defining the distortion characteristics of the vacuum forming process.

It is an object of the invention to provide improved elements and arrangements thereof for the purposes described which is inexpensive, dependable and fully effective in accomplishing its intended purposes.

These and other objects of the present invention will become readily apparent upon further review of the following specification and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. **1A** is a front perspective view of a flower pot having an embossed design on its outer peripheral surface.

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Fig. **1B** is a front perspective view of a flower pot having a plurality of sides.

Fig. **1C** is a front perspective view of a flower pot formed in the shape of a star.

Fig. **2A** is a front section view of a flower pot mold cavity having an embossed design on its interior surface and a plastic sheet ready to be vacuum formed according to the present invention.

Fig. **2B** is a front section view of the mold of Fig. **2A** after vacuum has been applied, the embossed flower pot being formed against the interior surface of the mold according to the present invention.

Fib. **2C** is a section view of a plastic flower pot according to the present invention removed from the flower pot mold of Figs. **2A** and **2B**.

Fig. **3** is a front view of a flower pot according to the prior art formed from a straight vacuum forming process having a distorted design on the outer surface of the flower pot.

Fig. **4A** is a perspective view of an embossed flower pot formed by straight vacuum forming according to present invention.

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Fig. **4B** is a perspective view of an embossed decorative wrapper that is bonded to at least a portion of the outer peripheral surface of the flower pot shown in Fig. **4A**.

Fig. **5A** is a front elevation view of a decorative flower pot having a decorative wrapper bonded to a vacuum formed flower pot according to the invention of Figs. **4A** and **4B**.

Fig. **5B** is a rear elevation view of the decorative flower pot of Fig. **5A**.

Fig. **6** is a front perspective view of a decorative flower pot formed by straight vacuum molding, the decoration being undistorted by the vacuum forming process according to the present invention.

Fig. **7** is a front view of a sheet of plastic material used to form a flower pot according to the present invention, the design imprinted on the sheet being pre-distorted to compensate for the distortion incurred during the vacuum forming process.

Fig. **8** is front view of a radial grid imprinted on a clear plastic sheet which, when vacuum formed into a flower pot according to the present invention, serves as a template for creating a compressed image of a desired design.

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Fig. **9** is a perspective view of the template of Fig. **8** being used to determine the color coordinates of a design printed on a flower pot that is to be copied.

Similar reference characters denote corresponding features consistently throughout the attached drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is a method for forming a decorative flower pot, and particularly forming a decoration on the outer peripheral surface of the flower pot. As shown in Fig. **1A**, a first embodiment of the method forms a decorative embossed pattern **102** on the outer peripheral surface **106** of a plastic flower pot **100**. The embossed pattern **102** may be any of a number of patterns, such as depictions of flowers, balls, bells, or any spaced apart raised portions in the outer peripheral surface **106** of the flower pot **100**, and a corresponding depressed portion on the inner peripheral surface of the flower pot **100**. The flower pot **100** with an embossed design **102** provides more rigidity as compared to an unembossed flower pot. A flower pot having a number of sides, corners, and contours provides not only a more atheistically pleasing flower pot, but one having greater

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structural integrity, as exemplified by the scalloped flower pot **110** and star shaped flower pot **112** in Figs. **1B-1C**,

The flower pot **100** and the embossed pattern **102** disposed thereon are formed by straight vacuum forming, as shown in Figs. **2A-2C**. In the straight vacuum forming process shown, a plastic sheet **202** is clamped in a frame **204** and heated. While the hot sheet **202** is rubbery, or in an elastic state, it is placed over a female mold **206**, the walls **210** of which correspond to the outer peripheral surface of the flower pot **100**, as shown in Fig. **2A**. A desired embossed design **208** is formed in the walls **210** and contours of the mold **206**. Air is removed from the mold cavity **212** by a vacuum from a pump or other source (not shown) applied through slots **214**, and atmospheric pressure forces the hot sheet **202** against the walls **210** of mold **206**, as shown in Fig. **2B**. When the plastic has cooled, the formed pot **220** is removed, as shown in Fig. **2C**, and final finishing and decoration may be done. The final finishing may include, e.g., imprinting a design on the outer peripheral surface of the flower pot using a rotational offset printing process.

The plastic sheet **202** may be a flat sheet **202** of polyvinyl chloride, or any sheet of a suitable plastic material including,

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but not limited to, polyethylene (PE), polyethylene terephthalate (PET), and ethylene-vinyl acetate (EVA).

The flower pots are best formed by quickly applying the vacuum before any portion of the sheet **202** has cooled. Slots **214** should be placed in all low or unconnected portions of the mold to eliminate any air that may be trapped under the hot sheet **202**. A suitable angle is included in the walls **210** for easy removal of the finished flower pot **220**.

The thickness of the plastic sheet **202** is normally less than 1 mm, preferably ranging from about 0.4mm to 0.9 mm. Although the normal depth of the flower pots produced are less than seven inches in diameter and seven inches in depth, larger pots up to fifteen inches are possible.

The draw, or draw ratio, of the mold **206** is the ratio of the maximum cavity depth to the minimum span across the top opening **216**. For high density polyethylene (PE), the best results are achieved when this ratio does not exceed 0.7:1, although good results are obtained when making a 4-inch flower pot made from polyvinyl chloride (PVC) and a draw of 1:1. Straight vacuum forming is known in the art of thermoforming equipment, and dies are relatively inexpensive.

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The placement of a decorative design on the plastic sheet **202** prior to vacuum forming can lead to a distorted design on a flower pot **302**, as shown in the prior art view of Fig. **3**. Thinning, stretching, and general distortion of the design is caused by the hot plastic sheet **202** first being drawn to the center **218** of the mold **206**. Sheeting at the edges of the mold **206** must stretch the most and thus becomes the thinnest portion of the formed item. A second embodiment of the present invention, described below, avoids the distortion caused by thinning of the plastic sheet **202**, and a third embodiment, also described below, discloses a method for compensating for distortion during forming.

Fig. **4A** illustrates a vacuum formed flower pot **402** having an embossed design **406** over which a decorative wrapper **404**, shown in Fig. **4B**, is wrapped to create a distortion free design disposed on the outer peripheral surface **406** of flower pot **402**. The flower pot **402** is molded using straight vacuum forming as previously disclosed. Although the flower pot may have a smooth outer peripheral surface **406**, a preferred design would incorporate a flower pot **402** having an embossed design and a wrapper **404** covering at least a portion of the outer peripheral surface **406** of the flower pot **402**. The wrapper **404** has the

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identical embossed design **400** on its outer surface as the flower pot, and when overlaid the flower pot **406**, the patterns on the flower pot **402** and wrapper **404** advantageously engage, not only providing a more aesthetically appealing flower pot, but also increasing the bonding surface, thereby preventing the wrapper **404** from shifting on the surface of the flower pot **402**. A bonding material, such as a conventional adhesive, is applied to the inner surface of the wrapper **404** and bonds the wrapper **404** to the outer peripheral surface of the flower pot **402**. As illustrated in Fig. **5A**, the resultant flower pot **502** has an undistorted decoration visible on the front of the flower pot. Fig **5B** illustrates the rear of the flower pot **502**, showing the exaggerated seam **504** formed by the ends of the wrapper **404**.

An alternative embodiment which creates a flower pot with an undistorted design on its outer peripheral surface involves compensating for distortion of the design during vacuum forming. This method entails printing a compressed, or pre-distorted design **704**, on the plastic sheet **702** prior to vacuum forming. As shown in Fig. **6** flower pot **600** is vacuum formed using the plastic sheet **702** shown in Fig. **7**. As can be seen from Fig. **7**, the compressed design **704** bears minimal relation to the design **604** on the outer peripheral surface of the flower pot **600**. Pre-

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distorting the desired finished design compensates for the stretching and thinning of the vacuum forming process.

Pre-distorting the image can be achieved by trial and error, or can be accomplished by the following distortion mapping process described in conjunction with Figs. **8** and **9**.

This third method starts with a flower pot **906** on which a desired image **908** is disposed. This may be accomplished by several means, including the wrapper method previously disclosed, or by simply drawing the desired image on the outer peripheral surface of an otherwise blank flower pot.

The key to this method is the creation of flower pot template **904**, into which a flower pot **906**, having the desired image **908**, is inserted. Template **904** is formed by vacuum forming a sheet of clear plastic **804**, the sheet having a radial matrix **802** formed on the lower surface of the sheet **804**. The radial matrix **802** has a multitude of numerically or otherwise identifiable sections **806** which, when stretched by the vacuum forming process previously disclosed, produces a clear flower pot having a stretched and distorted grid **910** disposed on its outer surface. The portion of the plastic sheet **804** on which the center **808** of the radial matrix is formed becomes the bottom of the template flower pot **904**, and the grid sections corresponding

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to the matrix's outer periphery **810** form the upper section **914** of the formed template **904**. The individual grid sections **806** comprising the radial matrix **802** must be small enough to adequately map the desired design into a color coordinate matrix. Although for relatively noncomplex designs, the grid sections **806** would be approximately 1/4 of an inch square, the more intricate the desired design, the tighter the matrix **802** must be. The size of each grid section **912** in the stretched and deformed matrix shown in Fig. **9** is exaggerated for the sake of this disclosure.

The purpose of creating this template having a deformed grid **910** is to overlay the desired image **908** with a clear grid which can be used to determine what each section of a plastic sheet must be colored in order to form a flower pot having an undistorted design once the sheet is vacuum formed.

Flower pot **906**, having the desired image **908**, is inserted into the template **904** and the color of each distorted grid section **912** is recorded and is used to color the appropriate section of a plastic sheet subsequently used to form a finished product. Once the design has been transferred to a plastic sheet, the sheet can be vacuum formed into a flower pot having a relatively undistorted design disposed on it outer surface.

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Given the fact that variations in distortion cannot be controlled completely, the template must be made as identical to the final product as possible, using a plastic sheet having the same characteristics as the finished product to best reproduce the distortion process the production version of the flower pot will experience.

It is further understood that the present invention is not limited to the embodiments described above, but encompasses any and all embodiments within the scope of the following claims.

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